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SCIENCE

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ANTAGONISM AND PERMEABILITY¹

By antagonism we mean that one toxic substance acts as an antidote to another. A solution containing salts in the proper proportions may have none of the toxic action of the individual salts. Such a mixture has been called by Loeb a physiologically balanced solution. It is found that physiological balance is of the greatest importance not only for marine organisms, but also for fresh-water and terrestrial plants and animals: these considerations have found practical application in agriculture.

In the hope of throwing light on the cause of antagonism the speaker made experiments on the penetration of salts into the cell. It was found that while NaCl alone penetrated rapidly the addition of a little CaCl₂ delayed penetration. It therefore seemed as though calcium antagonized sodium by preventing more or less completely its entrance into the cell. This idea had been suggested by Loeb but had not received experimental support.

These experiments (which included a number of salts) were carried out by means of the method of plasmolysis. This method did not yield quantitative data of the desired precision, but it was found possible to obtain much more accurate results by the method of electrical conductivity. By this method we measure the resistance offered by protoplasm to the passage of ions. In sodium chloride the resistance rapidly diminishes until it becomes stationary: this means that in NaCl the permeability of the protoplasm rapidly increases until death occurs,

¹ Address delivered before Section G, American Association for the Advancement of Science, at a symposium, December 27, 1916.